Scientific Evidence

CHAPTER 8

8.1 Chapter Overview

This chapter explores various scientific evidentiary issues that commonly arise in cases involving sexual assault. It provides a general introduction to various scientific methods or topics, including DNA testing, hair sample analysis, blood-typing evidence, bite mark evidence, drug facilitators, and

expert testimony. It also provides Michigan case law governing the admissibility of these methods and techniques.

> **Note:** The scientific techniques of hair analysis, discussed in Section 8.4, and blood typing, discussed in Section 8.5, have been generally replaced by DNA testing. Nonetheless, these two conventional laboratory techniques are discussed in this Benchbook because (1) old sexual assault cases involving these techniques might be reversed and remanded for retrial after the publication of this Benchbook; and (2) "cold" cases involving these techniques might be prosecuted after the publication of this Benchbook.

8.2 Expert Testimony in Sexual Assault Cases

This section discusses issues commonly arising regarding the admission of expert testimony in cases involving allegations of sexual assault:

- General requirements for admissibility of expert testimony.
- Expert testimony by physicians and medical personnel.
- Expert testimony on "rape trauma" and the emotional and psychological effects of sexual assault.
- Expert testimony on the emotional and psychological effects of battering.

A. General Requirements for Admissibility of Expert Testimony

Michigan Rules of Evidence 702 to 707 govern the use of expert testimony at trial. MRE 702 provides the standard for admissibility of expert testimony:

> "If the court determines that recognized scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise."

Note: Proposed amendment 01-29 would add the following sentence at the end of MRE 702: "If MCL 600.2955 requires either admitting or excluding the expert testimony, the court must rule as the statute requires." MCL 600.2955 governs the admissibility of expert scientific opinion testimony in civil wrongful death, personal injury, and property damage actions. The proposed Staff Comment in 01-29 states that the amendment would "conform the rule to *McDougall v Schanz*, 461 Mich 15 (1999), which held that a substantive rule of law found in a statute takes precedence over a rule of evidence adopted by the courts." Because MCL 600.2955 applies only in specified civil actions, the language in the proposed amendment presumably does not apply in criminal cases.*

*For more information on civil actions, see Chapter 10. For a detailed discussion of MCL 600.2955, see Ryan, *Expert Opinion Testimony and Scientific Evidence: Does MCL § 600.2955 "Assist" the Trial Judge in Michigan Tort Cases?* 75 U Det Mercy L Rev 263 (Winter 1998).

MRE 703 governs the bases of opinion testimony:

> "The facts or data in the particular case upon which an expert bases an opinion or inference may be those perceived by or made known to the expert at or before the hearing. The court may require that underlying facts or data essential to an opinion or inference be in evidence."

Note: Proposed amendment 1999-10 would require the admission of the factual bases underlying expert opinions. Additionally, the amendment would give discretion to the court to admit the factual bases before or after admitting the underlying expert opinions.

MRE 704 governs opinions on ultimate issues:

> "Testimony in the form of an opinion or inference otherwise admissible is not objectionable because it embraces an ultimate issue to be decided by the trier of fact."

MRE 705 governs disclosure of facts or data underlying the opinions:

> "The expert may testify in terms of opinion or inference and give reasons therefor without prior disclosure of the underlying facts or data, unless the court requires otherwise. The expert may in any event be required to disclose the underlying facts or data on cross-examination."

Note: See also MRE 706 on court-appointed experts, and MRE 707 on use of treatises for impeachment.

In *People* v *Beckley*, 434 Mich 691, 711 (1990), the Supreme Court articulated a three-part test for admissibility of expert testimony under MRE 702, discussed in further detail below: (1) the expert must be qualified; (2) the evidence must give the trier of fact a better understanding of the evidence or assist in determining a fact in issue; and (3) the evidence must be from a recognized discipline.

F The expert must be qualified.

*For jury instructions on the weight that a juror should give to expert testimony, see CJI2d 5.10 and 20.29 (for child sexual abuse cases).

There are two basic types of expert witnesses—those with academic training and those with practical experience. Witnesses with either background may be qualified to testify if they demonstrate understanding of the particular fact situation. *People v Boyd*, 65 Mich App 11, 14–15 (1975). Whether a witness's expertise is as great as that of others in the field is relevant to the weight rather than the admissibility of the testimony and is a question for the jury. See *Grow v W A Thomas Co*, 236 Mich App 696, 713-714 (1999) (the trial court did not err in qualifying a certified social worker to testify regarding post-traumatic stress disorder).* In cases involving sexual abuse of children, expert testimony has been presented by physicians, crisis counselors, social workers, police officers, and psychologists. See *Beckley, supra* at 711, and cases cited therein.

F The evidence must give the trier of fact a better understanding of the evidence or assist in determining a fact in issue.

Expert testimony must be helpful and relevant to explain matters not readily comprehensible to an average juror. In *People v Peterson*, 450 Mich 349, 373 (1995), modified 450 Mich 1212 (1995), the Michigan Supreme Court held that an expert witness may provide background information and explain the typical symptoms of child sexual abuse, as long as the testimony explains the complainant's specific behavior that might be incorrectly construed by the jury as inconsistent with that of an abuse victim or to rebut an attack on the complainant's credibility. Such specific behavior may include a delay in reporting, recantation, accommodation of the abuse, and secrecy. *Id*. at 373 n 12. However, an expert may not render an opinion that a complainant's particular behavior or set of behaviors indicates that a sexual assault in fact occurred. *Beckley, supra* at 729. Moreover, an expert may not comment on whether the complainant is being truthful. *People v Wilson*, 194 Mich App 599, 605 (1992).

F The evidence must be from a recognized discipline.

In general, expert testimony based on novel scientific principles or techniques is subject to the "*Davis-Frye* rule," which is based on *Frye v United States*, 54 App DC 46 (1923) and *People v Davis*, 343 Mich 348 (1955). Under this rule, the party offering novel scientific evidence has the burden of demonstrating that it is "recognized," i.e., that it is "generally accepted" by "impartial and disinterested experts of the relevant scientific community." See *People v Lee*, 212 Mich App 228, 262 (1995); and *People v Young*, 418 Mich 1, 23-24 (1983). A novel scientific principle or technique will be deemed "generally accepted" if a sufficiently large number of scientists in the relevant field reach "a consensus judgment of the scientific community." *People v Young (After Remand)*, 425 Mich 470, 485 (1986). Experts who are "impartial and disinterested" are ones whose reputations and livelihoods are not intimately connected with the evidence at issue. *Anton v State Farm*, 238 Mich App 673, 679 (1999).

The *Davis-Frye* rule does not apply to the soft sciences. Soft sciences include the social sciences and behavioral sciences, like psychology and psychiatry. The Michigan Supreme Court held in *Beckley*, *supra* at 720-721 that the *Davis-Frye* test does not apply to behavioral sciences based on the following rationale: "'Psychologists, when called as experts, do not talk about things or objects; they talk about people. They do not dehumanize people with whom they deal by treating them as objects composed of interacting biological systems. Rather, they speak of the whole person.' Thus it is difficult to fit behavioral professions within the application and definition of *Davis/Frye*. . . . We would hold that so long as the purpose of the evidence is merely to offer an explanation for certain behavior, the *Davis/Frye* test is inapplicable." See also *People v Manser*, 250 Mich App 21, 33 n 9 (2002) ("Where syndrome evidence is offered to explain certain behavior, the *Davis/Frye* test for recognizing admissible science is inapplicable.") But see *People v Hubbard*, 209 Mich App 234, 242, n 2 (1995), in which a Court of Appeals panel expressed its disagreement with this issue as presented in *Beckley*.

> **Note:** The United States Supreme Court has held that the *Frye* "general acceptance" test has been superceded by the adoption of the Federal Rules of Evidence. *Daubert v Merrell Dow Pharmaceuticals, Inc*, 509 US 579, 593-594 (1993). In its place, the Supreme Court adopted a more relaxed reliability assessment under FRE 702. *Id.* However, Michigan state courts are still bound by the stricter *Davis-Frye* standard until that standard is modified by our Supreme Court. *Boyd v W G Wade Shows*, 443 Mich 515, 523 (1993); *People v Bullock*, 440 Mich 15, 27 (1992); and *People v McMillan*, 213 Mich App 134, 137 n 2 (1995). But see MCL 600.2955, the statute governing the admissibility of expert scientific opinion testimony in tort cases, which contains a test for admissibility that closely resembles the relaxed *Daubert* criteria. For a detailed discussion of MCL 600.2955, *Davis-Frye*, and *Daubert*, see Ryan, *Expert Opinion Testimony and Scientific Evidence: Does MCL § 600.2955 "Assist" the Trial Judge in Michigan Tort Cases?* 75 U Det Mercy L Rev 263 (Winter 1998).

If the court determines that the expert testimony meets the foregoing three-part test, it must next determine whether the probative value of the expert testimony outweighs the danger of unfair prejudice. MRE 403 provides that relevant evidence may be excluded "if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence." However, on request, the trial judge may deem a limiting instruction an appropriate alternative to excluding the evidence. *People v Christel*, 449 Mich 578, 587 (1995).

> **Note:** In *Christel*, the Supreme Court stated that the danger of unfair prejudice was dispelled by the limitations the Court imposed on the scope of an expert's testimony regarding battered woman syndrome, discussed below. *Id.* at 591, n 24.

B. Expert Testimony by Physicians and Medical Personnel

*See Section 8.2(C) for a detailed discussion of expert opinion testimony concerning "rape trauma" and other behaviors exhibited by a victim or perpetrator.

The admission of expert testimony by an examining physician is an issue frequently addressed in sexual assault cases. Like other expert testimony, an examining physician's testimony will be admissible if the expert possesses specialized knowledge that will assist the trier of fact in understanding the evidence or determining a fact in issue under MRE 702. *People v Smith*, 425 Mich 98, 112 (1986). Such expert testimony, unlike expert testimony concerning the behavioral sciences,* may include an expert's opinion on the ultimate issue of whether the victim was sexually assaulted—as long as the opinion was based on findings within the realm of the expert's medical capabilities or expertise, and not simply on the emotional state of, or the history given by, the victim. *Id*.; MRE 704; see also *People v Izzo*, 90 Mich App 727, 730 (1979) (an expert witness may not act as a human lie detector and give a stamp of scientific legitmacy to the truth of the complaining witness's factual testimony concerning the rape).

In the companion cases of *People v Smith* and *People v Mays*, 425 Mich 98 (1986), the Michigan Supreme Court expressly refuted the notion previously articulated in *People v McGillen #2*, 392 Mich 278, 285 (1974), that an examining physician is not permitted to lend "expert opinion testimony as to the crucial issue of whether or not the prosecutrix was actually raped at a specific time and place." The Supreme Court in *Smith*, referring to this specific language in *McGillen #2*, held:

> "[W]e would emphasize that the quoted language is dicta, as the doctor there did *not* testify that the defendant had raped the victim at a specific time or place, or that she did not consent. Further, to the extent that this language suggests that an opinion regarding an ultimate issue is never permitted, such a blanket prohibition would clearly conflict with MRE 704." *Smith, supra* at 111. [Emphasis in original.]

In *Smith*, however, the Supreme Court found reversible error in the admission of the examining physician's opinion that the complainant had been sexually assaulted. The Supreme Court found that the opinion was based not on any findings within the realm of the expert's medical capabilities or expertise as an obstetrician/gynecologist, but rather on the emotion state and history of the complainant. *Id*. at 112. In *Mays*, the Supreme Court upheld the admission of the examining physician's testimony describing abrasions at the entrance of the complainant's vagina. The Court also upheld the admission of the physician's opinion that the complainant had been penetrated against her will, because the opinion was grounded upon objective evidence, even though other factors were also considered, such as the emotional state of the complainant and the expert's past experience with sexual assault cases. *Id*. at 114-115.

> **Note:** Some Court of Appeals' opinions have implied or expressly stated that an examining physician may not provide an expert opinion on whether the complainant was sexually assaulted at *a specific time and place* or by the *defendant* *at a specific time and place*. See *People v*

LaPorte, 103 Mich App 444, 453 (1981); *People v Byrd*, 133 Mich App 767, 779-780 (1984); and *People v Vasher*, 167 Mich App 452, 459 (1988).

An examining physician is not qualified to give an opinion on whether a victim was assaulted on the alleged date if the victim had intercourse following the alleged sexual assault but before the medical examination, unless a proper foundation has been established. *Id*. at 459. "A proper foundation requires some evidence as to the condition of the victim's pelvic area prior to the date of the alleged assault. Without such a foundation, the physician's testimony must be limited to whether penetration has occurred." *People v Naugle*, 152 Mich App 227, 236-237 (1986).

The following appellate opinions have considered an examining physician's testimony in criminal sexual conduct cases:

- *People v Wells*, 102 Mich App 558, 560, 562 (1980) (no error in admitting examining physician's opinion—"[T]his was a legitimate case of sexual assault"—finding that the opinion was based upon the expert's physical findings, the history given by the victim, the victim's emotional state, and the doctor's experience in examining alleged victims of sexual assault; the examining physician did not testify that the *defendant* raped the complainant at a specific time and place or that he believed the complainant's claim. Instead, the physician merely gave his expert opinion that there had been penetration against the complainant's will.)

- *People v LaPorte*, 103 Mich App 444, 451-453 (1981) (no error in admitting examining physician's opinion that victim was a "legitimate rape victim," where opinion was based on physical and emotional conditions of victim and no opinion was given on whether victim was raped by defendant).

- *People v Byrd*, 133 Mich App 767, 779-780 (1984) (no error in admitting examining physician's description of victim's physical and emotional condition and opinion that victim's physical condition—blunt force bruises and lacerations over entire body and bleeding in vaginal area—was consistent with a recent assault).

- *People v Hubbard*, 159 Mich App 321, 326-327 (1987) (no error in admitting examining physician's opinion that examination of the victim revealed evidence of trauma consistent with forceful penetration).

- *People v Vasher*, 167 Mich App 452, 459-460 (1988) (no error in admitting examining physician's testimony where it was confined to issue of whether sexual penetration occurred, where it was grounded upon objective evidence within realm of expertise as an obstetrician/gynecologist, and where physician did not express opinion as to place, specific time, or by whom rape occurred).

- *People v Swartz*, 171 Mich App 364, 376-378 (1988) (no error in admitting examining physician's description of victim's physical condition and opinion that she had been sexually assaulted, since observations and opinions were based on objective facts obtained from medical examination and not on victim's emotional state).

*See Section 8.7 for further discussion of SANEs and their role in conducting sexual assault evidence collection.

A Sexual Assault Nurse Examiner (SANE)* is typically a registered nurse (R.N.) or nurse practitioner who has specialized training in the forensic examination of sexual assault victims. Although SANEs generally collect evidence while doctors treat injuries and provide expert opinion testimony, SANEs may also be asked to render expert opinion testimony. As of this Benchbook's publication date, no published Michigan appellate court opinion has decided the admissibility of a SANE's expert opinion. However, other jurisdictions have. See, e.g., *Hussen v Commonwealth*, 511 SE2d 106, 107-109 (Vir App, 1999) (upheld SANE opinion that laceration just below victim's vaginal opening was not consistent with consensual, first time intercourse and opinion was not an opinion on an ultimate issue of fact); *Velazquez v Commonwealth*, 557 SE2d 213, 219-220 (Vir, 2002) (reversible error in admitting SANE opinion that the complainant's genital injuries were "inconsistent with consensual intercourse," because the SANE also stated that she held that opinion based on her belief that the injuries were "consistent with non-consensual intercourse"); *United States v Withorn*, 204 F3d 790, 796-797 (CA 8, 2000) (no abuse of discretion by trial court in permitting nurse midwife to testify that victim's overall injuries were consistent with violent sexual assault and probably caused by blunt force trauma); and *State v Humphrey*, 36 P3d 844, 851-852 (Kan App, 2001) (upheld nurse expert opinion that victim's injuries were consistent with blunt force penetrating trauma).

Another issue that may arise in expert medical testimony is the "human sexual response" and how its absence, coupled with visible physical injury to a victim's genital area, may lead a medical expert to conclude that sexual penetration of the vagina was unconsented. In *Commonwealth v Johnston*, 2000 WL 33177221 (Vir Cir Ct, 2000), the defendant brought a motion in limine to exclude as scientifically unreliable a SANE's opinion testimony to the effect that the victim's genital injuries, which were detectable by the naked eye, were inconsistent with triggering the "human sexual response." At issue in *Johnston* was the SANE's belief that there is a causal connection between the "human sexual response," genital injury, and consent. The SANE in *Johnston* agreed with the following definition of the "human sexual response," which was summarized by the defense counsel:

> "The 'human sexual response' is an automatic, immediate, and involuntary physical change that women go through in anticipation of consensual sexual intercourse. When the 'human sexual response' occurs, the labia become engorged with blood and change structurally to avoid genital injury. Because the 'human sexual response' protects against genital injury during consensual sex, the presence of genital injury detectable by gross visualization demonstrates that sexual activity took place without the woman's consent. Because the 'human sexual response' is automatic, immediate, and involuntary, factors such as the length of the foreplay period, the influence of drugs or alcohol, sexual technique, and the lack of lubrication do not affect the conclusion that the presence of genital injury detectable by gross visualization demonstrates sex without consent."

Based on this definition of "human sexual response," the SANE was expected to give an expert opinion to the effect that the presence of genital injuries

observable by gross visualization, i.e., by the naked eye, indicates that the "human sexual response" was not triggered. However, the circuit court found no support in the medical literature for this proposed opinion and thus found an insufficient foundation to warrant admission of such testimony. The circuit court also found nothing in the extensive medical literature relied upon by the SANE to support the theory that a person can distinguish nonconsensual from consensual sexual intercourse by the presence of genital injury detectable by the naked eye. Thus, the circuit court granted defendant's motion in limine and only permitted the SANE to testify about observable genital injuries and whether those injuries were consistent with penetration or sexual intercourse.

For a discussion of the *Johnston* case, including a discussion of the "human sexual response" and its relation to genital injury and consent, see Gaffney, *On the Female Sexual Response; Injury and Consent and the Virginia Case*, 4 Sexual Assault Report 6 (July/August 2001), p 81-82, 94-96. The author of this article reviews recent studies and refutes the definition of "human sexual response" provided in *Johnston*. According to the author, most researchers suggest that the "human sexual response" is not always automatic, immediate, and involuntary, for a sexual response can be affected by anxiety, learned behavior, age, drugs, and other factors, including "voluntary" inducement by cognitive, affective, or tactile stimulation. *Id.* at 82, 95. The author also found that it is inappropriate to use the absence of the "human sexual response" as an indicator of nonconsensual sex. The author states that SANEs cannot unequivocally state that there was or was not a "human sexual response" in a person, just as they cannot say there was or was not consent. *Id.* at 82. Finally, the author states that visible genital injury may depend on a number of factors, including the person's health, obstetric/gynecological history, age, and contraceptive devices.

C. Expert Testimony on "Rape Trauma" and the Emotional and Psychological Makeup of Victims and Defendants

1. Expert Testimony Regarding Victim Behaviors

Expert testimony regarding "rape trauma syndrome" is inadmissible to prove that a sexual assault occurred. *People v Pullins*, 145 Mich App 414, 419-422 (1985). In *Pullins*, a CSC I case involving a six-year-old child victim, the trial court admitted testimony from a therapist regarding the victim's post-incident behavior—being afraid to answer the phone and having trouble sleeping—as rape trauma syndrome evidence to establish that criminal sexual conduct occurred. The Court of Appeals held:

> "We . . . hold that evidence of rape trauma syndrome is not admissible . . . to prove that a rape in fact occurred. However . . . we do not mean to imply that evidence of emotional and psychological trauma suffered by a complaining witness in a rape case is inadmissible. Such evidence is relevant and jurors are fully competent to consider such evidence in determining whether a rape occurred, but it should not be presented with an aura of scientific reliability unless the *Frye* test is met. *Id*. at 421-422.

Additionally, a majority of justices of the Michigan Supreme Court, in *People v Beckley*, 434 Mich 691, 724, 729 (1990), concluded that "child sexual abuse accommodation syndrome" evidence is unreliable as an indicator of abuse and, as such, is inadmissible to show that sexual abuse has occurred. A majority of justices also held that an expert witness may not testify that the victim's allegations are true. A plurality of the justices held that an expert witness may testify that the particular behavior of the allegedly sexually abused child was characteristic of sexually abused children in general. However, this plurality of justices concluded that such testimony is only admissible to rebut an inference that a victim's behavior following the incident was inconsistent with that of a sexually abused child. *Id*. at 710.

In *People v Peterson*, 450 Mich 349, 352 (1995), modified 450 Mich 1212 (1995),* the Michigan Supreme Court reaffirmed and modified its holding in *Beckley*, *supra*, by reiterating that:

*This case was also consolidated with *People v Smith*, discussed *infra*.

- **F** An expert may not testify that the sexual abuse occurred.
- **F** An expert may not vouch for the veracity of a victim.
- **F** An expert may not testify whether the defendant is guilty.

The Supreme Court in *Peterson*, *supra* at 352-353, clarified aspects of child sexual abuse expert testimony by holding that (1) an expert may testify in the prosecutor's case-in-chief (rather than only in rebuttal) regarding typical and relevant symptoms of child sexual abuse for the sole purpose of explaining a victim's specific behavior that might be incorrectly construed as inconsistent with that of an actual abuse victim; and (2) an expert may testify regarding consistencies between the behavior of the particular victim and other victims of child sexual abuse to rebut an attack on the victim's credibility. *Id*.

Further, the Supreme Court specified two circumstances in which expert testimony is admissible to show that the victim's behavior was consistent with sexually abused victims generally:

> "Unless a defendant raises the issue of the particular child victim's postincident behavior or attacks the child's credibility, an expert may not testify that the particular child victim's behavior is consistent with that of a sexually abused child." *Id*. at 373-374.

In a case involving a child complainant's post-incident behavior of attempting suicide, the Michigan Supreme Court, in *People v Lukity*, 460 Mich 484, 500-501 (1999), found no abuse of discretion by the trial court in admitting expert testimony comparing the child victim's behavior with that of sexually abused children. In *Lukity*, the defendant was convicted of CSC I against his 14-year-old daughter. At trial, the complainant testified that defendant sexually assaulted her over 40 times during a two-year period. She also testified that, after reporting the sexual assaults, she attempted suicide. During the defense opening statement, the defense counsel stated that the complainant had "serious problems" that could have affected her ability to "recount and describe." The defense theory of the case was that complainant's testimony

was not believable, since she had emotional problems unrelated to the sexual abuse. An expert witness testified to the general characteristics of sexual abuse victims, including specific testimony regarding complainant's psychiatric behaviors being consistent with those of sexual abuse victims. The expert did, however, acknowledge that some characteristics of sexual abuse victims, such as attempting suicide, were also consistent with other types of traumas. The Michigan Supreme Court, applying *Peterson*, found no error requiring reversal in the admission of this expert testimony:

> "[The defense] theory raised the issue of complainant's post-incident behavior, e.g., her suicide attempts. Under *Peterson*, raising the issue of a complainant's post-incident behavior opens the door to expert testimony that the complainant's behavior was consistent with that of a sexual abuse victim. Accordingly, the trial court did not abuse its discretion in allowing [the expert] to testify.
>
> "Moreover, defendant effectively cross-examined [the expert] and convincingly argued in closing that the fact that a behavior is 'consistent' with the behavior of a sexual abuse victim is not dispositive evidence that sexual abuse occurred. Specifically, he argued that 'almost any behavior is not inconsistent with being a victim of sexual assault.'" *Lukity, supra* at 501-502.

In *People v Smith*, the case consolidated with *Peterson*, the Michigan Supreme Court found "an almost perfect model for the limitations that must be set in allowing expert testimony into evidence in child sexual abuse cases." 450 Mich at 381. In that case, the victim delayed reporting the abuse for five years, but the defendant did not ask the victim any questions suggesting that the delay in reporting was inconsistent with the alleged abuse or attack the victim's credibility. The trial court allowed a single expert to clarify, during the prosecutor's case-in-chief, that child sexual abuse victims frequently delay reporting the abuse. The expert's testimony helped to dispel common misperceptions held by jurors regarding the reporting of child sexual abuse, rebutted an inference that the victim's delay was inconsistent with the behavior of a child sexual abuse victim, and did not improperly bolster the victim's credibility. *Id.* at 379-380. For a case in which an expert witness improperly vouched for the child's credibility, see *People v Garrison (On Remand)*, 187 Mich App 657, 659 (1991) (expert witness testified that child's use of anatomically correct dolls "demonstrated that she had indeed been sexually abused").

In *People v Draper (On Remand)*, 188 Mich App 77 (1991), the Court of Appeals, in light of the Supreme Court's opinion in *Beckley*, *supra*, reversed its previous opinion in *People v Draper*, 150 Mich App 481 (1986), which upheld the admission of expert testimony by two psychologists who gave opinions that the victim had been sexually abused. In *Draper (On Remand)*, the Court of Appeals found that this expert opinion testimony was prohibited under *Beckley* because it went "beyond merely relating whether the victim's behavior is consistent with that found in other child sexual abuse victims. They are opinions on an ultimate issue of fact, which is for the jury's determination alone." *Id.* at 78-79. However, the Court found that the psychologists' testimony concerning the characteristics normally found in

sexually abused children was proper because it assisted the trier of fact without rendering an opinion regarding whether abuse had in fact occurred. *Id*. at 78.

*This case is further discussed in Section 8.2(B).

In *People v Smith*, 425 Mich 98, 102-104, 112, 114 (1986), the Michigan Supreme Court held as inadmissible to prove that a sexual assault occurred an obstetrician/gynecologist's expert opinion that was based on the victim's emotional state—"agitated," "extremely nervous" and "shaking"—and on the victim's history as she described it. However, the Supreme Court found that the portion of the expert opinion regarding forceful penetration, which was based on the expert's personal observation of a red mark on the victim's face and small abrasions at the entrance of her vagina, was admissible to prove that a sexual assault occurred.*

In acquaintance, intimate partner, and marital rape cases, a prosecutor may also seek to admit expert testimony on battering and its effects to help explain the victim's actions or behaviors—or to help the jury evaluate the victim's credibility. Although such expert testimony is commonly associated with the use of the "battered women's syndrome" defense to exculpate an accused, it may also be introduced by the prosecution.

In *People v Christel*, 449 Mich 578 (1995), the defendant was convicted of CSC I against his former intimate partner. On appeal, he asserted that the trial court erred in admitting testimony about victims of domestic violence from a clinical psychologist trained in the field of domestic violence. The prosecution offered this testimony at trial to help evaluate the complainant's credibility, and to rebut defendant's claims that the complainant was a liar, a self-mutilator, and an embezzler. The psychologist testified that women often remain in an intimate relationship even though abuse is occurring. As the abuse escalates over time, they may deny, repress, or minimize the abuse rather than express outrage. The Supreme Court concluded that the trial court erred in admitting this testimony because the requisite factual underpinnings for its introduction were lacking. The Court found that the complainant had ended her relationship with the defendant one month before the assault and did not try to hide or deny the assault. Moreover, she did not delay reporting the crime, but immediately sought medical attention with accompanying discussions with police. The complainant also never recanted her testimony that the assault occurred. Under these circumstances, the expert testimony was not relevant because the complainant's actions were not characteristic of victims of domestic violence.

See also *People v Daoust*, 228 Mich App 1 (1998) (prosecutor seeks to explain the behavior of a witness to an alleged crime); *People v Wilson*, 194 Mich App 599 (1992) (defendant seeks to prove that she committed murder in self defense); and *People v Moseler*, 202 Mich App 296 (1993) (defendant seeks to prove that the charged crime was committed under duress). For a general discussion of expert testimony on battering and its effects, see Lovik, *Domestic Violence: A Guide to Civil & Criminal Proceedings* (MJI, 2d ed, 2001), Section 5.8.

2. Expert Testimony Regarding Defendant Behaviors

In *People v Manser*, 250 Mich App 21, 32-34 (2002), a criminal sexual conduct case involving a victim under 13 years old, the defendant sought to introduce expert testimony, based on a scientific study, that persons who are falsely accused tend to exhibit certain reactions, including not taking accusations seriously and waiving legal rights. The trial court refused to admit such testimony. The Court of Appeals, relying on *Peterson*, *supra*, found that the relevant testimony in this case—that defendant was cooperative with police, that he agreed to talk with them, and that he made incriminating statements to them—was not behavior in need of explanation to the jury. The Court noted that criminal defendants talk to the police "for a myriad of reasons, including that they believe they can convince the police of their innocence." Accordingly, the Court found no abuse of discretion by the trial court in refusing to admit the expert testimony. However, the Court did agree with defendant that the trial court improperly used the *Davis-Frye* test to deny admissibility of the testimony, because the *Davis-Frye* test is inapplicable where syndrome evidence is offered to explain certain behavior. Nonetheless, the Court held that even though the trial court applied the wrong test to deny admissibility, it still achieved the correct result. *Manser*, *supra* at 32 n 9.

In *People v Watkins*, 176 Mich App 428 (1989), an armed robbery and felonious assault case, the Court of Appeals held that the trial court did not abuse its discretion in excluding expert opinion testimony from defendant's psychologist to the effect that a person with defendant's personality type would be much less likely to commit the charged crimes than someone else without such a personality type. The Court of Appeals found that such opinion testimony was an improper method of proving a defendant's character under MRE 405, which allows testimony of reputation and specific instances of conduct to prove character, but not opinion testimony.

In *People v Hamilton*, 163 Mich App 661 (1987), a murder and armed robbery case, the defendant talked with police and made conflicting statements concerning the robbery-murder; he also confessed to the shooting. In a motion pending retrial following a hung jury mistrial, defendant sought to admit in the retrial expert psychological opinion testimony regarding his psychological makeup to allow the jury to evaluate the credibility and reliability, i.e., the voluntariness, of his statements to police. The trial court denied defendant's motion, finding that the expert testimony on this issue should be excluded. However, the Court of Appeals found that the trial court abused its discretion, even though no insanity defense was asserted:

> "Under the facts of this case, we believe the trial court did not exercise its discretion when it excluded expert testimony which would have aided the jury in evaluating the credibility and reliability of defendant's statements to police. The trial court may not have done so in the belief that it did not have discretion since the defense of insanity was not raised. For the reasons stated herein, we find that it is within the sound discretion of the trial court to admit such evidence. We further find that it would be an abuse of discretion in

this case not to admit it if limitations similar to those stated below are imposed." *Id*. at 668.

> **Note:** The *Hamilton* Court went on to state that the psychologist "should not be permitted to give an opinion as to whether defendant was telling the truth when he made the statements to the police." *Id*. at 669.

8.3 Bite Mark Evidence

*"Forensic odontology" is defined as the application of the science of dentistry to the field of law. Note, *Bite Mark Evidence: Forensic Odontology and The Law*, 2 Health Matrix: J of Law-Medicine 303, 304 (1992).

Bite mark evidence and its analysis can play a prominent role in sexual assault cases, since bite marks appear frequently on victims in cases involving sexual assault. Bite mark analysis is part of the field of forensic odontology.*

A. No Need For *Davis-Frye* Hearing on Science of Bite Mark Analysis

In a case of first impression in Michigan, the Court of Appeals, in *People v Marsh*, 177 Mich App 161 (1989), held "that the science of bite mark analysis is sufficiently established that a trial court may admit the evidence without holding a *Davis-Frye* hearing." *Id.* at 162. In *Marsh*, the defendant was convicted of first-degree felony (criminal sexual conduct) murder for beating, sodomizing, and killing the victim by manual strangulation. During the autopsy, a suspected bite mark was observed on the victim's left breast. A forensic odontologist took photographs and made an impression of the suspected bite mark. The forensic odontologist also took photographs and made impressions, including a wax bite, of defendant's teeth. At trial, the forensic odontologist expressed an opinion "that the surface markings on the skin were consistent with bite marks and that the marks left by defendant's teeth in wax were consistent with the marks in the photographs." *Id*. at 164. Importantly, he concluded that "he could not say with reasonable certainty that the marks were made by defendant's teeth," but that "there were two marks that were consistent with defendant's teeth and that there was no discrepancy in the pattern of the marks which would totally rule out defendant." *Id.* On appeal, defendant claimed that the trial court should have held a *Davis-Frye* hearing before admitting the forensic odontologist's testimony. After finding that the admissibility of bite-mark evidence has been consistently upheld in other jurisdictions without the need of a *Davis-Frye*-type hearing, the Court of Appeals held that while the "idea" of bite mark evidence might be novel, the scientific procedures underlying it are not:

> "Based on the persuasiveness of the rulings in other jurisdictions, we too hold that the admissibility of a dental witness' bite-mark analysis does not depend on meeting the *Davis-Frye* standard. While the idea of using a bite-mark comparison to identify a perpetrator may seem novel, the scientific procedures used, such as x-rays, impressions and photographs, are not novel and, as in this case, may be submitted to the jury to see the comparison for itself. Accordingly, we find no error in the trial court's admission of [the forensic odontologist's] testimony without conducting a *Davis-Frye* hearing." *Marsh, supra* at 167.

The Court of Appeals also held that, contrary to defendant's assertion, the forensic odontologist's testimony was not the most damaging evidence against him. The Court found that the testimony merely indicated there was some consistency between the suspected bite marks and defendant's teeth, and that defendant could not be ruled out as the originator of the marks. The court concluded that the bite-mark evidence did not positively identify defendant; rather it was merely one piece of circumstantial evidence to establish identity. *Id*. at 168.

B. Statistical Probabilities

While the scientific procedures used in bite mark comparison are not novel and therefore not subject to *Davis-Frye* requirements, statistical probability evidence regarding the comparison of dental dentitions with bite marks is subject to *Davis-Frye* requirements.* In *People v Wright*, 461 Mich 906 (1999), the Michigan Supreme Court ordered the trial court to conduct a *Davis-Frye* hearing on the matter of the "testimony regarding the application of statistical probabilities to the comparison between defendant's dentition and the bite marks on the victim."

*Although statistical probabilities regarding bite mark evidence are subject to *Davis-Frye* requirements, this is not the case with statistical probability evidence regarding DNA testing and analysis. See Section 8.6(J) for more information on DNA statistical probability evidence.

> **Note:** The *Wright* case involved three orders of remand from the Michigan Supreme Court, two unpublished Court of Appeals' opinions, and at least one trial court opinion. For the Supreme Court orders, see *People v Wright*, 459 Mich 878 (1998); *People v Wright*, 461 Mich 906 (1999); and *People v Wright*, 463 Mich 992 (2001). For the Court of Appeals opinions, see *People v Wright*, unpublished opinion per curiam of the Court of Appeals, decided December 3, 1996 (Docket No. 179564); and *People v Wright*, unpublished opinion per curiam of the Court of Appeals, decided April 23, 1999 (Docket No. 179564) (the facts were laid out in this opinion). For the trial court opinion, see *People v Wright*, Wayne Circuit Court No. 93-7400-01 (September 15, 2000).

In a more recent bite mark case, in *People v Moldowan*, 466 Mich 862 (2002), the Michigan Supreme Court ordered the reversal of defendant's convictions and remanded the case for a new trial. In that case, two expert witnesses on bite-mark evidence, one of whom was the expert witness whose testimony was at issue in the *Wright* cases above, "either recanted testimony which concluded that bite marks on the victim were made by the defendant or presented opinion evidence which has now been discredited." *Id*. To support their conclusion, the Supreme Court quoted the prosecutor's statement about the case and bite mark evidence:

> "'In the totality of the circumstances of this case, it simply is not fair to say that the defendant or defendant's counsel should have known about the problems with the bite-mark evidence prior to trial. The same can also be said with regard to the later-discovered alibi witnesses. Because of the very nature of the drug and prostitution business, these witnesses are difficult to find. Their names are usually fake names, and they certainly do not want to be found. Without the bite-mark evidence and with the additional alibi witnesses, the result of the trial could have been different. For these reasons, it appears that the defendant may have suffered "actual prejudice" as that term is used in MCR 6.508(D)(3)(b)(i) and (iii).'" *Id*. at 863.*

*It is unclear whether this statement was made at trial or was contained in an appellate brief.

Other jurisdictions have upheld admission of an expert's opinion that a defendant inflicted the victim's bite mark (or wound) when the opinion was couched with "to a reasonable degree of scientific [or dental or medical] certainty." See, e.g., *State v Stinson*, 397 NW2d 136, 137-140 (Wis Ct of App, 1986); *Bradford v State*, 460 So2d 926, 929-930 (Fla Dist Ct of App, 1984); *State v Caze*, 875 SW2d 253, 258 (Tenn, 1994); and *State v Kleypas*, 602 SW2d 863, 870 (Missouri Ct of App, 1980). For a case upholding the reliability of using *photographs* of the victim's bite wounds, instead of the actual wound or plaster casts of the wound, when compared with a defendant's dental impressions, see *State v Green*, 290 SE2d 625, 630 (North Carolina, 1982) ("We find no reason to suspect that the methodology employed by this expert witness was anything less than scientifically sound and reliable.")

8.4 Hair Sample Analysis

> **Note:** DNA testing has generally replaced the scientific techniques of hair analysis and blood typing. Nonetheless, these two conventional laboratory techniques are discussed in this Benchbook because (1) old sexual assault cases involving these techniques might be reversed and remanded for retrial after the publication of this Benchbook; and (2) "cold" cases involving these techniques might be prosecuted after the publication of this Benchbook.

Hair is classified as trace evidence—a minute particle that can be analyzed, identified, and compared in a criminal investigation to determine its origin. Testing for hair analysis may include measurements of length and diameter, comparisons of color, root structure, ends, cuticles, medulla content, twist, and a determination of blood type. The following methods have been used to analyze hair: microscopic analysis, neutron activation analysis, and ion microprobic analysis.

"Microscopic analysis of hair requires the use of a comparison optical microscope. Two glass slides are prepared and placed under a comparison microscope. On one slide is hair from the control sample (a known source); on the other is hair from the suspect sample (an unknown source). The comparison microscope allows the forensic hair examiner to view simultaneously the hairs on both slides without having to shift fields of vision from one slide to the other. Side by side, the hairs can be compared." *Scientific Evidence* (MJI, 1994), p 161.

The following Michigan appellate cases have addressed the admissibility of microscopic hair analysis:

F *People v Kosters*, 175 Mich App 748, 753-754 (1989), lv grd 434 Mich 900 (1990), order lv gtd vacated and lv den 437 Mich 937 (1991):

The Court of Appeals upheld the trial court's admission of expert testimony comparing pubic hairs taken from the defendant with those

found in his 1-year-old daughter's diaper immediately following visitation with her. The defendant was alone with his daughter during visitation, and, following visitation, the mother observed vaginal irritation on the daughter. The Court of Appeals found that "the pubic hair evidence did not need to be excluded because it tended to connect defendant with the crime and was admissible under MRE 401." The Court reasoned that "the evidence showing that the pubic hairs could have come from defendant was relevant and admissible because of its tendency to make the existence of other important facts more probable or less probable than it would be without the evidence."

> **Note:** But see Chief Justice Cavanagh's and Justice Levin's dissenting opinions to the Supreme Court's order denying leave to appeal. They stated that such hair sample evidence produced only an infinitesimally small possibility that defendant was the abuser and that any minuscule probative value of such evidence was outweighed by its unfair prejudicial effect. *Kosters*, *supra* at 939-940.

F *People v Vettese*, 195 Mich App 235 (1992):*

The Court of Appeals upheld the admission of an expert witness's testimony that one of several hairs taken from the victim's bedsheets was similar in all respects to a pubic hair taken from defendant, and that the hair could have come from defendant. The expert testified that both sets of pubic hair came from a Caucasian with a Mediterranean background, but the expert was unable to say with certainty that defendant was the source of the hair or what percentage of the subgroup population might be the source. The Court of Appeals first held that microscopic hair analysis satisfies *Davis-Frye*. The Court next held that, in the context of the case, such hair analysis constituted relevant evidence under MRE 401, for it placed the defendant within the group of suspects who could have committed the crime, and that its probative value was not outweighed by unfair prejudice under MRE 403 because there was substantial, if not overwhelming, evidence of defendant's guilt. However, the Court did state that if the prosecutor offered only the hair-matching evidence in support of identification, it would have concluded that the prejudicial effect substantially outweighed the probative value. *Vettesse*, *supra* at 243. The Court also disagreed with the positions of Chief Justice Cavanagh and Justice Levin in their dissenting opinions to the Supreme Court's order denying leave to appeal in *Kosters.*

*See also *People v Kurzawa*, 202 Mich App 462, 465 (1993), rev'd in part on other grnds *People v Perry*, 460 Mich 55 (1999), which followed the precedent of *Vettese*, and found no error in the admission of expert hair analysis testimony.

8.5 Blood-Typing Evidence (Through Blood, Semen, and Other Body Fluids)

> **Note:** DNA testing has generally replaced the scientific techniques of blood typing and hair analysis. Nonetheless, these two conventional laboratory techniques are discussed in this Benchbook because (1) old sexual assault cases involving these techniques might be reversed and remanded for retrial after the publication of this Benchbook; and (2)

> "cold" cases involving these techniques might be prosecuted after the publication of this Benchbook.

Forceful physical contact between the perpetrator and victim often involves the transfer of body fluids, including blood, saliva, perspiration, and semen, as well as other biological matter, such as fecal matter and vomitus. Such evidence may be deposited at the crime scene or transferred between the perpetrator and victim. The following subsections discuss the background of blood typing, the admissibility of blood typing evidence, the importance of a person's secretor status, and the electrophoresis method of testing fresh and dried blood.

A. Blood Typing Background

In *Scientific Evidence* (MJI, 1994), p 77, the background of blood typing was described as follows:

> "Blood typing was discovered in 1901. The classification system is called the A-B-O system. Later in 1937, the Rh factor in blood was identified. Since then, more than 100 different blood factors have been shown to exist. In theory, no two people, except identical twins, can be expected to have the same combination of blood factors. Blood factors are controlled genetically, and therefore, a highly distinctive feature for personal identification. However, unless subjected to DNA analysis, blood at its best is only 'could be' or 'elimination' evidence.
>
> "Blood is made up primarily of water (55%). The rest is protein, red and white blood cells, and platelets (45%). *Antigens*, which provide the blood type characteristics (A-B-O and Rh, among others), are found on the surface of red blood cells. *Antibodies*, are found in the blood serum (When the protein mixes with the red blood cells, it clots. If the clotted material is removed the liquid that remains is called 'serum.'). *The fundamental principle of blood typing is that for every antigen, there exists a specific antibody*. Each one reacts only with the specific other; and more than 15 antigen/antibody reactions have been identified.
>
> "The presence or absence of the A and B antigen determines a person's A-B-O blood type, the presence or absence of the D antigen determines a person's Rh factor." [Emphases in original.]

In his book, *Forensic DNA Typing*, John Butler explained the forensic utility of ABO blood grouping determinations:

> "An ABO blood group determination, which was the first genetic tool used for distinguishing between individuals, can be performed in a few minutes but is not very informative. There are only four possible genotype groups — A, B, AB, and O — and 40% of the population is type O. Thus, while the ABO blood groups are useful for excluding an individual from being the source of a crime scene sample, the test is not very useful when an inclusion has been made, especially if the sample is type O." Butler, *Forensic DNA Typing*, (Academic Press, 2001), p 3-4.

B. Admissibility of Blood-Typing Evidence

In Michigan, blood typing evidence has some incremental probative value and therefore is admissible to show a possible connection between the defendant and criminal acts. In *People v Punga*, 186 Mich App 671, 673 (1991), the Court of Appeals resolved a conflict among its panels regarding the admissibility of blood type evidence, and followed the rationale in *People v Horton*, 99 Mich App 40 (1980), vacated on other grounds 410 Mich 865 (1980), which found blood typing evidence, like other pieces of physical evidence, admissible to show a possible connection between the defendant and criminal acts.* In doing so, the *Punga* Court rejected the rationale of *People v Sturdivant*, 91 Mich App 128 (1979), which found no probative value in such evidence. In *Punga*, the Court of Appeals, following *Horton*, found no abuse of discretion by the trial court in admitting blood type evidence indicating that defendant was among 34% of the male population that could have produced the semen found on the victim's clothing. The Court held as follows:

> "Evidence of blood type that places a defendant within a certain group of the population is relevant according to the definition of relevant evidence contained in MRE 401, in that it has some tendency to make the existence of a fact of consequence to the determination of the action more or less probable than it would be without the evidence. We therefore find no abuse of discretion in the trial court's decision to admit the instant evidence of blood type." *Punga, supra* at 673.

*See MCR 7.215(I)(1), which confers precedential effect to opinions published on or after November 1, 1990. For a list of opinions following the *Horton* rationale, see *Punga, supra* at 673.

C. Secretor Status

Persons who are "secretors" are simply persons who can have their blood type determined from an analysis of body fluids (semen, saliva, vaginal fluids, gastric fluids), in addition to their blood. *Scientific Evidence Manual* (MJI, 1994), p 77. Secretors comprise 80% of the population. *Id*.

D. Electrophoresis

Blood typing evidence may be derived from electrophoresis. Electrophoresis is defined as:

> "a physical method for the separation of biologically important proteins through the use of electric current. Proteins are very complex molecules which assume positive, negative, or neutral charges, depending on the solution in which they are placed. When these charged molecules are placed on an appropriate medium and subjected to an electrical field, they will migrate toward the pole of the opposite charge. Blood proteins vary in size, shape, density, and charge; consequently they vary in electrophoretic mobility. Therefore, after electrophoresis, they are separated into distinct bands on the supporting medium." *People v Young (After Remand)*, 425 Mich 470, 477-478 (1986), citing Grunbaum, *Potential and Limitations of Forensic Blood Analysis* in *Handbook for Forensic Individualization of Human Blood and Bloodstains*, quoted in

> Jonakait, *Will Blood Tell? Genetic Markers in Criminal Cases*, 31 Emory L J 833, 840 (1982).

Electrophoresis may be administered on a variety of samples, including blood (dried or fresh), semen, and DNA.

1. Blood

Electrophoresis of fresh blood is considered generally reliable and not subject to *Davis-Frye*. *People v Young (After Remand)*, *supra* at 486.

Electrophoresis of evidentiary dried bloodstains through the Wraxall thin-gel *multi-system* does not meet *Davis-Frye* requirements. In *Young (After Remand)*, *supra*, a first-degree murder case where dried bloodstains were taken from the victim's sidewalk, stairway, and porch and analyzed through a Wraxall thin-gel multi-sytem electrophoresis method,* the Michigan Supreme Court found that under the *Davis-Frye* test, the prosecution had failed to demonstrate "general acceptance" of the reliability of electrophoresis of evidentiary bloodstains by the scientific community. *Young (After Remand)*, *supra* at 501. Specifically, the Supreme Court found that the prosecution did not fulfill its burden with respect to two issues: the reliability of the Wraxall thin-gel multisystem analysis and the effects of crime scene contaminants on the blood sample. *Id*. at 475, 495, 498-499. The Supreme Court also found that new scientific procedures must have *independent verification*, which the Wraxall method did not:

*The Wraxall thin-gel multi-system method simultaneously analyzes three genetic markers—PGM (phosphoglu-comutase), EsD (esterase d), and GLO (glyoxylase 1)—on a single, thin-layer of starch gel. This differs from a single-system method, which only tests one protein or genetic marker per sample.

> "The scientific tradition expects independent verification of new procedures. When other scientists analyze and repeat the tests, they counteract the dangers of biased reporting. It is scientists not responsible for the original research that confirm its validity.
>
> "Although electrophoresis has been generally accepted as reliable in the scientific community for many years, Wraxall's multisystem test is a new technique. No independently conducted verification studies have been undertaken. Scientists evaluating the technique necessarily base their conclusions on the unpublished reliability study conducted by the multisystem's developer. General agreement in the scientific community cannot be achieved on the basis of this type of testing alone." *Id*. at 499.
>
> **Note:** The holding in *Young (After Remand)* has been distinguished and limited to its facts by subsequent Court of Appeals opinions. These opinions, discussed below, suggest that the opinion in *Young (After Remand)* only applies to electrophoresis of *dried evidentiary bloodstains*, and only to electrophoresis involving the Wraxall thin-gel multi-system method. It is also important to note that *Young (After Remand)* was decided in 1986. Consequently, the Wraxall multi-system method may now meet *Davis-Frye* requirements.

Electrophoresis of evidentiary dried bloodstains through a *single-system* meets *Davis-Frye* requirements. In *People v Stoughton*, 185 Mich App 219 (1990), the Court of Appeals decided a case that distinguished between multi- and single-systems of electrophoresis. A single-system method allows testing

of only one protein or genetic marker per sample, whereas a multi-system method allows testing of multiple proteins or genetic markers per sample. *Id.* at 222. In *Stoughton*, consistent with the Michigan Supreme Court's opinion in *Young (After Remand)*, the Court of Appeals held that the Wraxall thin-gel multi-system method of electrophoresis on dried blood stains had still not achieved sufficient general scientific acceptance for reliability and thus was inadmissible. *Stoughton*, *supra* at 227. However, it held that electrophoretic through a *single system method* enjoys general acceptance for reliability in the scientific community, and thus the results were admissible into evidence. *Id*. at 229. Additionally, the Court held that the single system method need not be subject to the independent validation requirement of *Young (After Remand)*, *supra*: "[W]hen the evidence clearly shows that the single system technique enjoys general scientific acceptance, satisfaction of the independent validation standard from [*Young (After Remand)*] is not required." *Stoughton*, *supra* at 229.

In *People v Gistover*, 189 Mich App 44 (1991), a first-degree murder case where electrophoresis was performed on a dried bloodstain taken from defendant's blue jeans, the defendant claimed that, based on *Young (After Remand)*, *supra*, such testing was unreliable when used on dried bloodstains. The Court of Appeals rejected this argument, finding that the *Young (After Remand)* opinion only applies to the Wraxall thin-gel multi-system test, and that the electrophoresis used in this case was not the same. The Court articulated the following minimal criteria to prevent relitigation of the issue of a test results' admissibility:

> "In sum, we hold that where adequate safeguards have been implemented, such as utilization of samples of known types as controls for comparison, a second, independent reading by another analyst, use of analysts who periodically undergo proficiency testing, adherence to established protocols, reporting of only unambiguous banding patterns, and where PGM, GLO and EsD markers have not been typed simultaneously, the results of electrophoresis typing of dried evidentiary bloodstains is admissible into evidence in this state because it has gained general scientific acceptance for reliability among impartial and disinterested experts in the field. Where these minimal criteria have been met, the issue of the test results' admissibility need not be relitigated in each case."* *Gistover*, at 53-54.

*PGM, GLO, and EsD are polymorphic enzyme or marker systems meaning, respectively, phosphoglucomutase, glyoxylase 1, and esterase d. *Scientific Evidence* (MJI, 1994), p 78.

The human leukocyte antigens (HLA) test to establish paternity in a criminal sexual conduct case meets *Davis-Frye* requirements. In *People v Taylor*, 185 Mich App 1 (1990), the defendant was convicted of CSC I for sexually assaulting a twelve-year-old girl, who later became pregnant and bore a child. Defendant denied paternity. Consequently, an HLA typing test was performed on defendant, the victim, and the infant. At trial, an expert in hematology, pathology, and percentage testing testified that, on the basis of the test results, there was a 97-99% probability that defendant was the father of the child. On appeal, defendant claimed the trial court erred by not suppressing the results of the HLA testing. The Court of Appeals found no abuse of discretion by the trial court in admitting the results of HLA testing in a criminal action,* because it is a test widely accepted in the scientific community as an accurate

*The results of HLA testing are admissible in a paternity action pursuant to MCL 722.716. *Taylor*, *supra* at 5.

method of determining paternity probabilities. It further found that the trial testimony supported the reliability of HLA testing, and that the results were relevant to show a connection between defendant and the criminal act.

2. Semen

Evidence of serological electrophoresis on semen is admissible. In *People v Furman*, 158 Mich App 302 (1987), electrophoresis testing was performed on semen deposited in the victim. The trial court admitted the results of this testing, which revealed that the donor was a Group A secretor, the same as defendant. An expert witness testified that the donor came from approximately 12% of the population. On appeal, although no objection was made at trial, defendant challenged the foundation for the electrophoresis testing on semen, because he felt it did not clearly establish that such testing had met the standards of scientific acceptance. The Court of Appeals distinguished the holding in *Young (After Remand)*, *supra* at 480-490, finding that the Supreme Court in *Young* "used language which appears to limit the holding to the facts of that case." *Furman*, *supra* at 329.The Court of Appeals concluded that because electrophoresis on semen was not considered by the Supreme Court in *Young*, and because no challenge to the foundation of the electrophoresis evidence was made below, the issue was waived.

8.6 DNA Testing and Admissibility

This section discusses DNA (deoxyribonucleic acid) testing and its potential application in sexual assault cases.

To gain an understanding of DNA evidence, this section begins by discussing the general background of DNA biology and DNA testing techniques, and then moves on to discuss the legal requirements to admit DNA testing and statistical interpretation evidence. The final subsection explores the right of an indigent defendant to obtain an expert witness in cases involving DNA evidence.

A. DNA Molecule

The DNA molecule has been described as follows:

> "The [DNA] molecule is a double helix, shaped like a twisted ladder. Phosphate and deoxyribose sugar form the rails of the ladder. Four chemical bases—Adenine (A), Cytosine (C), Guanine (G), and Thymine (T)—lie next to each other on the sugar links along the sides of the ladder. Each A always bonds with a T on the other side of the ladder, and each C always bonds with a G on the other side of the ladder, so that the possible base pairs on the ladder are A-T, T-A, C-G, and G-C. The base pairs are connected by a hydrogen bond, such that the bonds form the rungs of the ladder. There are approximately three billion base pairs in one DNA molecule. Although no two human beings have the same sequence of base pairs (except for identical twins), we share many sequences that

create common characteristics such as arms, legs, fingers, and toes. The sequences of variation from person to person are known as polymorphisms. They contain different alleles, which are alternate forms of a gene capable of occupying a single location of a chromosome. Polymorphisms are the key to DNA identification because they create the individual characteristics of everyone and are detectable in laboratory testing." *People v Adams*, 195 Mich App 267, 270 (1992).

B. Background Information Regarding Chromosomes, Genes, Alleles, and DNA Markers

The following background information is provided to assist the reader in further understanding the basic science of DNA testing:

> "Within human cells, DNA found in the nucleus of the cell (nuclear DNA) is divided into chromosomes, which are dense packets of DNA and protection proteins called histones. The human genome consists of 22 matched pairs of autosomal chromosomes and two sex determining chromosomes. Thus, normal human cells contain 46 different chromosomes or 23 pairs of chromosomes. Males are designated XY because they contain a single copy of the X chromosome and a single copy of the Y chromosome, while females contain two copies of the X chromosome and are designated XX. Most human identity testing is performed using markers on the autosomal chromosomes, and gender determination is done with markers on the sex chromosomes.
>
> "The DNA material in chromosomes is composed of 'coding' and 'non-coding' regions. The coding regions are known as *genes* and contain the information necessary for a cell to make proteins. A gene usually ranges from a few thousand to tens of thousands of base pairs in size. Approximately 50 000-100 000 genes exist in the human genome . . . . Genes only make up ~5% of human genomic DNA. . . . Markers used for human identity testing are found in the non-coding regions either between genes or within genes (i.e. introns) and thus do not code for genetic variation.
>
> "Polymorphic (variable) markers that differ among individuals can be found throughout the non-coding regions of the human genome. The chromosomal position or location of a gene or a DNA marker in a non-coding region is commonly referred to as a *locus* (plural: *loci*). . . .
>
> "Pairs of chromosomes are described as *homologous* because they are the same size and contain the same genetic structure. A copy of each gene resides at the same position (locus) on each chromosome of the homologous pair. One chromosome in each pair is inherited from an individual's mother and the other from his or her father. The DNA sequence for each chromosome in the homologous pair may or may not be identical since mutations may have occurred over time.
>
> "The alternative possibilities for a gene or genetic locus are termed alleles. If the two alleles at a genetic locus on homologous chromosomes are different, they are termed *heterozygous* and, if the alleles are identical at a particular locus, they are termed *homozygous*. Detectable differences in alleles at corresponding loci are essential to human identity testing.

> "A *genotype* is a characterization of the alleles present at a genetic locus. . . . A DNA *profile* is the combination of genotypes obtained for multiple loci." Butler, *Forensic DNA Typing* (Academic Press, 2001), p 16-18. [Emphasis in original.]

C. Types of DNA Testing

There are two primary approaches for performing DNA typing: (1) the polymerase chain reaction (PCR) method; and (2) the restriction fragment length polymorphisms (RFLP) method. Butler, *Forensic DNA Typing* (Academic Press, 2001), p 23. The PCR method is the principal method of analyzing DNA evidence in laboratories across the world,* and it will therefore be discussed in more detail in this chapter. For information on the RFLP method, see *Id*. at 3, 10, 23-24. Also discussed in this chapter, although briefly, are two additional DNA testing techniques: mitochondrial DNA (mtDNA) typing and Y-chromosome short tandem repeat (STR) typing.

*The Michigan State Police Forensic Laboratory began exclusively using the PCR method in 1999.

D. The Polymerase Chain Reaction (PCR) Method

The PCR method of analyzing DNA has been described as follows:

> "PCR is an enzymatic process in which a specific region of DNA is replicated over and over again to yield many copies of a particular sequence . . . . This molecular 'xeroxing' process involves heating and cooling samples in a precise thermal cycling pattern over ~30 cycles . . . . During each cycle, a copy of the target DNA sequence is generated for every molecule containing the target sequence . . . .
>
> "Theoretically after 30 cycles approximately a billion copies of the target region on the DNA template have been generated . . . . This PCR product, sometimes referred to as an 'amplicon', is then in sufficient quantity that it can be easily measured by a variety of techniques . . . ." Butler, *Forensic DNA Typing* (Academic Press, 2001), p 39.

E. Short Tandem Repeats (STRs)

The following background information on short tandem repeats is provided to assist the reader in understanding how they relate to DNA markers and DNA testing:

> "[G]enomes are full of repeated DNA sequences. These repeated DNA sequences come in all types of sizes, and are typically designated by the length of the core repeat unit and the number of contiguous repeat units or the overall length of the repeat region. Long repeat units may contain several hundred to several thousand bases in the core repeat.
>
> "These regions are often referred to as *satellite* DNA and may be found surrounding the chromosomal centromere. . . .
>
> "DNA regions with repeat units that are 2-6 bp [base pairs] in length are called microsatellites, simple sequence repeats (SSRs), or short tandem repeats (STRs). STRs have become popular DNA repeat

> markers because they are easily amplified by the polymerase chain reaction (PCR) without problems of differential amplification. This is due to the fact that both alleles from a heterozygous individual are similar in size since the repeat size is small. The number of repeats in STR markers can be highly variable among individuals which makes them effective for human identification purposes." Butler, *Forensic DNA Typing* (Academic Press, 2001), p 53. [Emphasis in original.]

In the United States, 13 core STR loci were chosen to serve as the basis for the Combined DNA Index System, or CODIS,* national database. These 13 core loci, which are analyzed using well-established PCR methods, are as follows: CSF1PO, FGA, TH01, TPOX, VWA, D3S1358, D5S818, D7S820, D8S1179, D13S317, D16S539, D18S51, and D21S11. *Id*. at 62.

*See Section 11.3 for further discussion of CODIS.

> **Note:** For a discussion of DNA nomenclature, see *Id*. at 18 (e.g., the STR marker TH01 means that it is from the "tyrosine hydroxylase" gene, located on chromosome 11; the STR marker D16S539 means the following: "D" for DNA, "16" for chromosome 16, "S" for single copy sequence, "539" for 539th locus described on chromosome 16).

For more information PCR/STR testing, visit http://www.cstl.nist.gov/biotech/strbase/index.htm (last visited July 25, 2002).

F. Advantages and Disadvantages of PCR Typing

1. Advantages

- Minute amounts of DNA template may be used from as little as a single cell.
- DNA degraded to fragments only a few hundred base pairs in length can serve as effective templates for amplification.
- Large numbers of copies of specific DNA sequences can be amplified simultaneously with multiplex PCR reactions.
- Contaminant DNA, such a fungal and bacterial sources, will not amplify because human-specific primers are used.

2. Disadvantages

- The target DNA template may not amplify due to the presence of PCR inhibitors in the extracted DNA.
- Amplification may fail due to sequence changes in the primer binding region of the genomic DNA template.
- Contamination from other human DNA sources besides the forensic evidence at hand or previously amplified DNA samples is possible without careful laboratory technique and validated protocols.

The foregoing advantages and disadvantages were taken from Butler, *Forensic DNA Typing* (Academic Press, 2001), p 50-51.

G. Male-Specific Y-Chromosome STR Markers

STR markers associated with the Y-chromosome can be used in special situations where the perpetrator's DNA type cannot be clearly developed from a mixture of male and female biological material, or in situations where no spermatozoa has been recovered from the biological material. Recent studies suggest that Y-chromosome markers may be valuable in making associations when the examination of the sexual assault victim is delayed. See de Mazancourt, *Y-STR DNA Amplification as Biological Evidence in Sexually Assaulted Female Victims With No Cytological Detection of Spermatozoa*, 125 (2-3) *Forensic Science International* 212 (2002), p 212-216.*

*A copy of this study may be purchased at http://www.elsevier.com/locate/forsciint (last visited July 25, 2002). For articles regarding this study, see *Test Can Prove Rape Days Later*, available on-line at http://www.newscientist.com/news (last visited July 25, 2002); and *New Test for Y Chromosomes Can Indicate Rape Days Later*, 5 *Sexual Assault Report* 5 (May/June 2002), p 78.

The efficacy of Y-chromosomal testing was explained as follows:

> "The Y chromosome . . . [has] application to male identification in forensic situations. . . . The ability to separate and identify the male component of a mixture is valuable for many forensic situations. For example, evidence from sexual assaults [may] contain[] a mixture of DNA from the male perpetrator and the female victim. Using Y-chromosome-specific primers can improve the chances of detecting low levels of the perpetrator's DNA in a high background of the female victim's DNA." Butler, *Forensic DNA Typing* (Academic Press, 2001), p 120. [Citations omitted.]

> **Note:** Y-STR testing is not done routinely. It is used mainly in special circumstances and to deal with problematic samples.

H. Mitochondrial DNA (mtDNA) Testing

Biological evidence may present itself in sexual assault cases in which standard PCR/STR testing cannot be applied (i.e., when the biological material is limited or severely degraded, or when it involves hair shafts, teeth, and bone). *Id.* at 122. In such circumstances, Mitochondrial DNA (mtDNA) testing may be an alternative solution when trying to determine human identity.

Mitochondrial DNA was explained as follows:

> "The vast majority of the human genome is located within the nucleus of each cell. However, mitochondria, which are located in the cytoplasm and provide the energy for the cell, contain a small circular genome. Mitochondrial DNA (mtDNA) has 16 569 base pairs and possesses 37 genes . . . . A non-coding 'control region', also known as the D-loop, exhibits a fair degree of variation between individuals and is therefore useful for human identity testing purposes." *Id.* at 121.

> **Note:** As with Y-STR DNA testing, Mitochondrial DNA testing is not done routinely. It is used mainly in special circumstances, such as when the sample involves skeletal remains, etc.

I. Cases Involving the Admissibility of DNA Evidence

In 1992, RFLP testing was found to be generally reliable in the scientific community and admissible as evidence in Michigan. *People v Adams*, *infra*. Three years later, in 1995, PCR testing was found to be generally reliable and admissible as evidence in Michigan. *People v Lee*, *infra*. As a result of the foregoing opinions, trial courts may take judicial notice of the general acceptance within the scientific community of both RFLP and PCR testing. *People v Coy*, 243 Mich App 283, 291-292 (2000). However, new or novel methods included within such testing techniques are still subject to *Davis-Frye* requirements.*

*See Section 8.6(I)(2) for further discussion of this issue.

The following cases discuss the admissibility of DNA typing evidence in Michigan:

1. PCR and RFLP Tests Meet Davis-Frye Requirements

F *People v Adams*, 195 Mich App 267, 277-280 (1992):

On appeal of his armed robbery, kidnapping, and two CSC I convictions, the defendant claimed that the trial court erred in admitting the results of RFLP DNA testing (using the "Southern Blotting" procedure) completed on a sample of dried semen taken from the victim's blue jeans. In a case of first impression in Michigan, the Court of Appeals found that "DNA identification testing" meets *Davis-Frye* requirements because it is "generally accepted in the scientific community as reliable." Accordingly, trial courts "may take judicial notice of the reliability of DNA identification testing." *Adams*, *supra* at 277. Additionally, the Court held that "before a trial court admits the test results into evidence, the prosecutor must establish in each particular case that the generally accepted laboratory procedures were followed." *Id*.

F *People v Lee*, 212 Mich App 228, 261-283 (1995):

In this first-degree felony murder case, the defendant claimed that the trial court erred by admitting the results of PCR DNA testing (using the "reverse-dot blot" or "blue-dot" procedure) completed on a hair found in defendant's car, linking him to the victim. In a case of first impression in Michigan where one gene or locus (the DQ alpha gene) was analyzed by using the PCR method of DNA testing, the Court of Appeals found that it was not bound to follow *Adams*, *supra*, since that case involved RFLP testing, a significantly different method of DNA testing. Nonetheless, the Court found that the prosecution satisfied its burden under *Davis-Frye* in establishing PCR DNA testing as generally accepted as reliable in the scientific community. Accordingly, the Court held that Michigan trial courts may take "judicial notice of the reliability of DNA testing using the PCR method." *Lee*, *supra* at 282-283. Although contamination of the evidence is a significant concern when using the PCR method, the Court held that, contrary to defendant's argument, the evidence at the *Davis-Frye* hearing established the existence of "adequate controls and procedures to guard against contamination in the PCR process,

which if followed, will produce reliable and accurate test results." *Lee*, *supra* at 281. The Court held that the issue of whether proper procedures were followed is a question of fact for the jury:

> "Defendant has not shown that the potential for contamination makes the PCR method unreliable. Again, if proper laboratory procedures are followed to prevent contamination, then the PCR method appears to produce accurate results. Whether the proper procedures and safeguards are followed in a particular case is a matter for the jury to consider in determining how much weight it should give the results. However, where there are serious errors in a particular laboratory's work, a court may rule the test results themselves to be inadmissible." *Id*. at 281. [Citation omitted.]

The Court in *Lee*, as in *Adams, supra*, held that before a trial court admits the test results into evidence, "the prosecutor must still show that generally accepted laboratory procedures were followed." *Id*. at 283. The Court also recognized the effect that PCR's limitations might have on the trier of fact, and it therefore required cautionary instructions be given to the jury (at least for PCR DNA testing involving the analysis of one gene or locus through the "reverse dot blot" procedure):

> "If there are concerns regarding the weight that juries will give PCR test results, those concerns are overstated. As long as it is made clear to juries that this type of testing contains inherent limitations and care is taken to avoid confusing the PCR and RFLP methods, the evidence should not be misinterpreted. Where the prosecution attempts to use PCR evidence along the same lines as RFLP evidence—to identify rather than to exclude an individual—then greater care must be undertaken to explain to the jury its probative limitations." *Id*.

Regarding defendant's argument that PCR DNA testing lacked independent validation, the Court held that the lack of validation of the PCR method through independently conducted studies did not justify reversing the trial court's decision to admit the DNA evidence, since such studies are only required when members of the relevant scientific community disagree on the reliability of novel scientific techniques—a circumstance not present with PCR testing.

F *People v McMillan*, 213 Mich App 134, 136-137 (1995):

The defendant appealed his second-degree murder and kidnapping convictions, claiming that the trial court erred in admitting DNA evidence based upon the PCR method. The defendant specifically claimed that the prosecutor failed to prove that the PCR method was generally accepted as reliable. The Court of Appeals, relying on *Lee, supra,* held that the PCR method is generally accepted in the scientific community as being reliable. *Id*. at 136-137. Additionally, it held that, as required in *Lee*, the prosecutor must show that generally accepted laboratory procedures were followed. The Court found such procedures followed in this case. *McMillan, supra* at 137. Finally, the Court declined the prosecution's invitation to replace the *Davis-Frye* standard with the more relaxed standard under *Daubert v Merrell Dow*

Pharmaceuticals, Inc, 509 US 579 (1993), finding that it is bound to follow *Davis-Frye*, even though the Federal Rules of Evidence superceded *Frye*—at least until the Michigan Supreme Court states otherwise. See *McMillan*, *supra* at 137 n 2; and Section 8.2(A).

F *People v Leonard*, 224 Mich App 569, 586-592 (1997):

In this case, the results of RFLP DNA testing of seminal fluids taken from the victim's vagina were admitted into evidence, linking defendant to the charged crimes. Defendant was eventually convicted of CSC I, breaking and entering an occupied dwelling, and two counts of armed robbery. On appeal, he claimed that the RFLP DNA testing method, which was at the time being replaced by the PCR method, lacked reliability. The Court of Appeals, relying on *Lee*, *supra*, held that although RFLP testing was being replaced by PCR testing in cases where there was a small or degraded or contaminated sample, RFLP testing is a more reliable and precise method of identification, and it was not being replaced by the PCR method because it lacked reliability. Defendant also disputed the reliability of the Michigan State Police laboratory's testing procedures. The Court of Appeals held that defendant failed to show the procedures used by the MSP laboratory were unreliable, since basically the same procedures were used in *Adams*, *supra*. Further, the Court held that the MSP laboratory undertook an even more extensive analysis than the laboratory in *Adams*. Defendant also argued that the MSP lab's protocol has not been generally accepted in the relevant scientific community, since it was never validated by independent scientists. The Court of Appeals found defendant's argument meritless, because independent validation is not necessary where no scientific dispute exists over the testing protocol (and defendant did not establish any such dispute), and the RFLP method of DNA testing has been already established as accepted in the scientific community.

F *People v Vaughn*, 200 Mich App 611, 619-620 (1993), rev'd on other grounds 447 Mich 217 (1994):

The defendant was convicted of CSC I and kidnapping. On appeal, he argued that he was wrongfully convicted because the prosecution failed to submit the evidence presented in the sexual assault evidence kit for DNA identification testing, even though defendant never, before appealing, requested DNA testing. In finding no error, the Court of Appeals stated it was not aware of any authority that compelled the prosecution to perform DNA testing on evidence:

> "We believe there is a distinction between the failure to develop evidence and the failure to disclose evidence. . . .
>
> "To the extent that defendant's argument on appeal can be read as a request that this Court order that such testing be done, we decline to do so. . . . Furthermore, we note that the other identification evidence presented at trial was significant." *Id*. at 619-620.

2. Novel PCR and RFLP DNA Testing Methods and Laboratory Procedures Must Still Meet Davis-Frye Requirements

*See Section 8.2(A) for more information on *Davis-Frye* requirements.

A trial court may take judicial notice of the general acceptance of both PCR and RFLP DNA testing methods within the scientific community. *People v Coy*, 243 Mich App 283, 291-292 (2000). However, new or novel methods included within such testing must still meet *Davis-Frye** requirements by being generally accepted in the relevant scientific community. *People v Chandler*, 211 Mich App 604, 611 (1995). Additionally, the prosecution must establish, if disputed, two other facts: (1) the general acceptance of the particular laboratory procedures used in that case; and (2) compliance with those generally accepted procedures. *Id*. at 609.

*The *Davis-Frye* hearings were held in Grand Rapids on September 5, 6, 11, and 12, 2000.

In a trilogy of circuit court cases involving combined *Davis-Frye* hearings,* the AmpF/STR Profiler Plus/ABI 310 Genetic Analyzer method of PCR DNA testing, which uses a computer-aided system of capillary electrophoresis to compare several different genes called short tandem repeats (STRs), was held to meet *Davis-Frye* requirements as being generally accepted in the relevant scientific community. See *People v Cavin*, Lake County Circuit Court, File No. 00-4395-FY (October 18, 2000); *People v Phillips*, Kent County Circuit Court, File No. 00-02025-FC (October 25, 2000); and *People v Kopp*, Kent County Circuit Court, File No. 00-04014-FC (October 20, 2000). However, trial courts may not take judicial notice of the general acceptance of either PCR STR profiling or the use of the ABI 310 Genetic Analyzer method until a Michigan appellate court declares that such procedures meet *Davis-Frye* requirements. If and when this occurs, the prosecution will still have to establish, if disputed, compliance with generally accepted laboratory procedures. *Chandler*, *supra* at 609.

Other jurisdictions have held that PCR STR testing using the Profiler Plus and Cofiler Kits are generally accepted in the scientific community. See *People v Shreck*, 22 P3d 68, 79-82 (Colorado, 2001) (held that PCR STR systems, including STR multiplex systems, such as the Profiler Plus and Cofiler kits, are sufficiently reliable and admissible under Colorado Rule of Evidence 702). See also *State v Butterfield*, 27 P3d 1133, 1143-1145 (Utah, 2001) (Profiler Plus Amplification Kit and ABI CE 310 Automated Capillary Electrophoresis Machine generally accepted in the forensic community under Utah Rule of Evidence 702, based on scientific literature [cited in case], validation studies, and expert testimony); *People v Hill*, 89 Cal App 4th 48, 55-60 (Cal App, 2001) (Profiler Plus Test Kit admissible under *Frye*); and *People v Owens*, 187 Misc 2d 838, 840-843 (NY Sup Ct, 2001) (held AmpF/STR Profiler Plus and Cofiler Kits are generally accepted in scientific community).

J. DNA Statistical Interpretation Evidence

An important area of concern in DNA testing is the validity of statistical analysis of the scientific procedures involved with DNA testing. "DNA statistical analysis determines the frequency with which a particular match

occurs in a target population—how likely or unlikely it is that an individual other than the defendant has the same DNA bands as those found at the crime scene and in defendant's blood." *People v Chandler*, 211 Mich App 604, 608 (1995). The fields of population genetics, human genetics, and demographics are responsible for determining the statistical significance of a declared match.

1. DNA Statistical Evidence Not Subject to Davis-Frye Test

Unlike novel scientific methods or procedures used in DNA testing, statistical interpretation evidence need not be examined under *Davis-Frye*.* In *People v Adams*, 195 Mich App 267, 277-280 (1992), a case involving RFLP DNA testing of dried semen taken from the victim's blue jeans, the defendant was convicted of armed robbery, kidnapping, and two counts of CSC I. On appeal, he argued that the crime scene evidence was contaminated and that the statistical analysis of the DNA identification testing should not have been admitted into evidence since it led to an improper "trial by mathematics." He specifically questioned the "basic product rule" method and the notion of the Hardy-Weinberg equilibrium (discussed below), arguing "that populations fail to randomly mate because identifiable subpopulations tend to mate within their own ethnic community because of economic forces and lack of social mobility." *Id*. at 277-278. The Court of Appeals rejected defendant's argument and found that, even though the statistical evidence was not specifically subjected to *Davis-Frye* requirements, it was, like serological testing, relevant and admissible. The Court further found that any questions concerning the size of the database or the Hardy-Weinberg equilibrium go to the weight of the evidence, and should be left to the jury. *Adams, supra* at 279.

*However, see Section 8.3(B) for discussion of bite-mark statistical evidence being subject to *Davis-Frye* requirements.

In *Chandler, supra*, a criminal sexual conduct case in which RFLP DNA testing was conducted on semen found on the victim's bathrobe, underpants, and sheets, the Court of Appeals reaffirmed its decision in *Adams, supra*, holding that DNA statistical interpretation evidence need not meet *Davis-Frye* requirements and any challenges go to its weight, not admissibility:

> "Defendant also argues that DNA statistical analysis evidence must survive scrutiny under the *Davis/Frye* test. Defendant contends that *Adams* did not subject the statistical analysis portion of the testing to *Davis/Frye* and thus it was erroneously decided. Similarly, the trial court in the present case did not apply a *Davis/Frye* test. As noted, every jurisdiction that has considered this question since the Lander & Budowle article, including those states that have *Frye*-type tests, has concluded that DNA statistical evidence satisfies the *Frye* test. Although defendant correctly notes that *Adams* did not specifically subject the challenged evidence to a *Davis/Frye* test, we conclude that such an examination was unnecessary. *Adams* held that challenges to the statistical evidence is relevant to its weight, not its admissibility. . . . Given the split of authority regarding this issue, we adhere to and reaffirm *Adams*. The trial court did not abuse its discretion in admitting the DNA statistical evidence." *Chandler*, *supra* at 611-612.

See also *People v Leonard*, 224 Mich App 569, 591 (1997) ("[S]tatistical evidence [in DNA cases] need not be subjected to a *Davis-Frye* test. This

Court has held that any challenges to the statistical evidence are relevant to the weight of the evidence and not to its admissibility.") [Citations omitted.]

*See Lander & Budowle, *DNA Fingerprinting Dispute Laid to Rest*, Nature (October 27, 1994).

The "basic product rule" method* of DNA statistical analysis is generally accepted in the relevant scientific community and therefore Michigan courts may take judicial notice of such analyses. See *People v Leonard*, 224 Mich App 569, 590 (1997); *People v Coy*, 243 Mich App 283, 296 n 7 (2000); and *Chandler*, *supra* at 610-611. The "basic product rule" has been defined as follows:

> "The basic product rule estimates the frequency of genotypes in an infinite population of individuals who choose their mates and reproduce independently of the alleles used to compare the samples. Although population geneticists describe this situation as random mating, these words are terms of art. Geneticists know that people do not choose their mates by lottery, and they use 'random mating' to indicate that the choices are uncorrelated with the specific alleles that make up the genotypes in question.
>
> "In randomly mating populations, the expected frequency of a pair of alleles at each locus depends on whether the two alleles are distinct. If a different allele is inherited from each parent, the expected single-locus genotype frequency is twice the product of the two individual allele frequencies. But if the offspring happens to inherit the same allele from each parent, the expected single-locus genotype frequency is the square of the allele frequency. These proportions are known as Hardy-Weinberg proportions. Even if two populations with distinct allele frequencies are thrown together, within the limits of chance variation, random mating produces Hardy-Weinberg equilibrium in a single generation." *Reference Manual on Scientific Evidence 2d ed* (Federal Judicial Center, 2000), p 525-526.

2. When DNA Evidence Must Be Supplemented With Statistical Analysis

*See *People v Adams*, 195 Mich App 267, 279 (1992), a case in which the defendant alleged crime scene contamination, where the Court of Appeals held: "The results of DNA identification testing would be a matter of speculation without the statistical analysis."

At least in cases involving mixed-stain samples, DNA evidence presented at trial must be supplemented with statistical analysis indicating the significance of a DNA match—otherwise the evidence produces speculation and is meaningless.* In *People v Coy*, 243 Mich App 283 (2000), the Court of Appeals held that evidence of a DNA match is inadmissible absent some accompanying analytic or interpretive evidence regarding the likelihood of a match. In *Coy*, the victim was found dead in her bedroom, suffering from 25 to 30 stab wounds. At trial, the prosecution introduced DNA evidence of two samples of blood taken from a broken knife blade (found in the victim's bedroom) and from the bedroom doorknob. A forensic serologist testified that the samples constituted mixtures of blood from more than one person, i.e., "mixed blood" samples. The serologist was unable to testify positively that the blood in the samples belonged to either defendant or the victim. However, the serologist testified that neither defendant nor the victim could be excluded as possible contributors to the mixed DNA samples. Because the forensic serologist's laboratory policy forbade it, no statistical estimates for the mixed samples were given. The Court of Appeals found that admission of the challenged DNA testimony, without accompanying interpretive evidence,

constituted outcome-determinative plain error, and any forfeiture by defendant's failure to object at trial did not extinguish the error.

The Court of Appeals in *Coy* explained the need for statistical analysis as follows:

> "DNA typing produces two distinct, but interrelated, items of information: 1) whether a match exists between the samples; and 2) if a match exists, the ratio expressing the statistical likelihood that 'the crime scene samples came from a third party who had the same DNA pattern as the suspect.' The latter correlation is necessary because, even though two human genomes may vary at approximately three million sites, the DNA typing analysis currently employed examines only a few sites for variation in the DNA sequence. The theory is that, besides identical twins, no two individuals will have entire DNA sequences which are identical. The DNA prints which result from the current FBI procedure may not be unique since the entire DNA molecule is not analyzed. Since two unrelated individuals may have identical DNA patterns from the fragments examined in a particular analysis, the potential exists for a match to be mistakenly found. For this reason, statistical interpretation regarding the probability of a coincidental match or the likelihood that two unrelated individuals have the same DNA type is necessary." *Id.* at 295, quoting *Nelson v State*, 628 A2d 69, 75-76 (Del, 1993). [Citations omitted.]

The Court of Appeals held as follows:

> "We conclude that absent some analytic or interpretive evidence concerning the likelihood or significance of a DNA profile match, [the forensic serologist's] testimony concerning the potential match between defendant's DNA and the DNA contained in the mixed blood samples found on the knife blade and the doorknob was insufficient to assist the jury in determining whether defendant contributed DNA to the mixed sample. . . . We emphasize that we do not now declare or delineate the appropriate articulations for expressing the extent or meaning of a potential match, but merely hold that some qualitative or quantitative interpretation must accompany evidence of the potential match." *Id*. at 301-302. [Citations omitted.]

Importantly, the Court of Appeals provided the following cautionary instruction:

> *We emphasize that by no means should our decision be construed to suggest that the admission of DNA testing evidence lacking the accompanying, interpretive statistical analysis in every case represents error requiring reversal*. In this case, however, we cannot sanction defendant's conviction on the basis of mischaracterized and unexplained expert testimony concerning the possible presence of defendant's blood on the knife blade and the doorknob." *Id*. at 313. [Emphasis added.]

K. An Indigent Defendant's Right to Appointment of DNA Expert Witness

*The *Leonard* case is also discussed in Section 8.6(I)(1).

A defendant is not entitled per se to a court-appointed DNA expert at trial under the Due Process Clause. Rather, entitlement to a court-appointed expert is conditioned on a particularized showing that defendant cannot otherwise proceed safely to trial without the expert, and that defendant will be prejudiced and receive a fundamentally unfair trial without such assistance. See *People v Leonard*, 224 Mich App 569 (1997);* and MCL 775.15. In *Leonard*, the defendant requested authorization to hire a DNA expert to review the testimony and exhibits adduced at a suppression hearing. The trial court authorized defense counsel to retain such an expert at a rate not to exceed $125 an hour. The trial court found the fees and planned hours of defendant's current DNA expert to be excessive. The defense stated it was unable to obtain another DNA expert. After being convicted of CSC I, breaking and entering an occupied dwelling, and two counts of armed robbery without the assistance of a court-appointed expert, the defendant moved for a new trial, arguing that his due process rights were violated by the failure to appoint a DNA expert and in denying him a continuance to obtain such an expert. The trial court granted defendant a new trial, finding that he was "entitled" to a DNA expert at trial under the Due Process Clause. On a prosecution appeal, the Court of Appeals held that the trial court abused its discretion in ordering a new trial, concluding that defendant was not "entitled" to a court-appointed DNA expert witness at trial under the Due Process Clause. The Court found that, instead, a defendant must make a particularized showing of need for the expert:

> "[A] defendant is entitled to the appointment of an expert at public expense only if he cannot otherwise proceed safely to trial without the expert. MCL 775.15; MSA 28.1252. In other words, a defendant must show a nexus between the facts of the case and the need for an expert. *People v Jacobsen*, 448 Mich 639, 641; 532 NW2d 838 (1995). Accordingly, the instant trial court's reasoning and conclusion that defendant was *entitled* to a DNA expert at trial and, thus, is entitled to a new trial was error.
>
> "In any event, assuming that defendant should have had a DNA expert at trial but was erroneously deprived of one, either through ineffective assistance of counsel or through trial court error, it was incumbent on the trial court to determine if defendant was prejudiced and received a fundamentally unfair trial as the result of not having expert assistance. . . . The instant trial court engaged in no such analysis and made no such determination." *Id*. at 582-583. [Emphasis in original.]

8.7 Sexual Assault Evidence Collection Kits and SANEs

The following subsections provide information on sexual assault evidence collection kits and Sexual Assault Nurse Examiners (SANEs).

A. Sexual Assault Evidence Collection Kits

The Michigan Sexual Assault Systems Response Task Force in *The Response to Sexual Assault: Removing Barriers to Services and Justice* (April 2001), p 48, states that "[t]he early and appropriate performance of a forensic examination is of critical importance for the health of survivors of sexual assault and for the prosecution of offenders." The Report on p 47 also states that "[*l*]ack of forensic evidence greatly reduces the chance for successful prosecution in a sexual assault case."*

*See Appendix D for a copy of the Michigan State Police's *Standard Recommended Procedures for the Emergency Treatment of Sexual Assault Victims.*

MCL 333.21527(3) defines a "sexual assault evidence kit" as:

> "[A] standardized set of equipment and written procedures approved by the department of state police which have been designed to be administered to an individual principally for the purpose of gathering evidence of sexual conduct, which evidence is of the type offered in court by the forensic science division of the department of state police for prosecuting a case of criminal sexual conduct under sections 520a to 520*l* [the Criminal Sexual Conduct Act, except for the DNA identification profiling statute in MCL 750.520m]* of the Michigan penal code, Act No. 328 of the Public Acts of 1931."

*See Chapter 2 for information regarding the Criminal Sexual Conduct Act.

MCL 333.21527(1) governs the requirements for administration of sexual assault evidence collection kits:

> "If an individual alleges to a physician or other member of the attending or admitting staff of a hospital that within the preceding 24 hours the individual has been the victim of criminal sexual conduct under sections 520a to 520*l* [the Criminal Sexual Conduct Act, except for the DNA identification profiling statute in MCL 750.520m]* of the Michigan penal code . . . the attending health care personnel responsible for examining or treating the individual immediately shall inform the individual of the availability of a sexual assault evidence kit and, with the consent of the individual, shall perform or have performed on the individual the procedures required by the sexual assault evidence kit."

*See Chapter 2 for information regarding the Criminal Sexual Conduct Act.

> **Note:** The Michigan Sexual Assault Systems Response Task Force in *The Response to Sexual Assault: Removing Barriers to Services and Justice* (April 2001), p 48, has recommended that the 24-hour requirement in MCL 333.21527(1) be amended to "96 hours or longer" and "at the discretion of the forensic examiner," because of the improvements in DNA technology, forensic evidence collection, and other technologies.

For purposes of MCL 333.21527, "the administration of a sexual assault evidence kit is not a medical procedure." MCL 333.21527(2).

See Sections 9.5(I)(3) and 10.7 for information regarding the recovery of costs for the administration of sexual assault evidence kits.

B. Sexual Assault Nurse Examiners (SANEs)

In seeking ways to more effectively collect sexual assault medical evidence and to treat sexual assault victims, some Michigan communities have established specialized Sexual Assault Nurse Examiner (SANE) Programs.* A SANE Program includes:

> "the use of a clinician (usually a registered nurse or nurse practitioner) who conducts the forensic exam of the sexual assault victim. . . . The clinician is specially trained in forensic evidence collection, sexual assault trauma response, forensic techniques using specialized equipment, expert witness testimony, assessment of injuries, STD [Sexually Transmitted Disease] treatment, and pregnancy evaluation and treatment." [Citations omitted.] Lang, *Sexual Assault Nurse Examiner Resource Guide for Michigan Communities* (Michigan Coalition Against Domestic and Sexual Violence, 1999), p 9.

*See Appendix C for a list of local Michigan communities that have SANE Programs. See also Section 1.6(A) for discussion of SANEs and their relationship to Sexual Assault Response Teams (SARTs).

SANE programs are either hospital-based (in hospital emergency rooms or in medical offices connected to hospitals) or community-based. For a general discussion of these two types of programs, and their advantages and disadvantages, see Littel, *Sexual Assault Nurse Examiner (SANE) Programs: Improving the Community Response to Sexual Assault Victims* (US DOJ, Washington, D.C., April 2001), p 10-11; and Lang, *Sexual Assault Nurse Examiner Resource Guide For Michigan Communities*, Michigan Coalition Against Domestic and Sexual Violence (1999), p 31-33.

A SANE* must complete a specialized training program, which typically consists of at least 40 hours of classroom instruction on various forensic and medical issues. *Littel*, *supra* at 9. Some SANE programs further specify the accomplishment of a set number of clinical hours to build SANE experience. *Id*. Some of a SANE's responsibilities are as follows:

*SANEs also go by different titles, such as Forensic Nurse Examiners (FNEs). Much of the terminology varies across the country, partly because different SANE/FNE programs developed independently from one another. *Littel*, *supra* at 16.

- To screen and examine the victim for injuries, and, if needed, refer the victim to a physician for care.
- To document (and photograph) the size, shape, color, and location of all injuries.
- To obtain brief (not detailed) synopsis of facts surrounding alleged sexual assault to guide in evidence collection.
- To obtain consent from the victim to do the forensic examination and to release the evidence to police.
- To report the alleged sexual assault to police, if applicable. MCL 750.411 imposes a legal duty upon every person, firm, or corporation conducting any hospital or pharmacy to immediately report to the head of the applicable police department, by telephone and in writing, the name, residence, whereabouts, and character and extent of the injuries of any person suffering from any wound or other injury inflicted by means of a knife, gun, pistol or other deadly weapon, or by other means of violence.

*See Section 7.15(D) for more information on MCL 750.411's mandatory reporting requirements.

- **F** Conduct forensic evidence collection using Michigan's standardized sexual assault evidence collection kit.* Some of these collection procedures require the SANE to:
  - obtain the victim's medical, reproductive, and sexual history;
  - collect the victim's clothing;
  - conduct a physical assessment (head to toe), including visual assessment of genital trauma;
  - collect specimens from body surfaces (skin, hair, and nail clippings) and from body fluids and orifices;
  - perform blood draw and urine collection (for pregnancy and drug analysis); and
  - use a colposcope* when examining for genital trauma. A colposcope is an optical instrument that magnifies and enhances visualization to allow detection of microlacerations, bruises, and other injuries that may be undetectable to the naked eye. A colposcope may be equipped with a fiber optic light source and a camera to photodocument genital injuries.
- **F** To treat the victim for any sexually transmitted diseases, and to provide information regarding STDs and HIV.
- **F** To provide emergency contraception to the victim.
- **F** Offer post-exposure HIV prophylaxis when there is evidence of direct contact of the victim's vagina, anus, or mouth with the perpetrator's semen or blood.
- **F** Maintain detailed chain of custody on all evidence.
- **F** To testify in court.

The foregoing responsibilities were taken from Lang, *Sexual Assault Nurse Examiner Resource Guide for Michigan Communities* (Michigan Coalition Against Domestic and Sexual Violence, 1999), p 9-12. For more information on SANEs and SANE Programs, see *Id.*

*See Appendix D for a copy of the Michigan State Police's *Standard Recommended Procedures for the Emergency Treatment of Sexual Assault Victims.*

*SANEs also use medscopes, or adapted dental cameras, which take digital images. Compared to colposcopes, medscopes are generally easier to use, more portable, and less expensive. See Littel, *Sexual Assault Nurse Examiner (SANE) Programs: Improving the Community Response to Sexual Assault Victims* (US DOJ: Washington D.C., April 2001), p 12-13.

8.8 Drug-Facilitated Sexual Assault

Along with force, coercion, fraud, disguise, position of authority, and the exploitation of a victim's age or mental incapacity, perpetrators of sexual assault also use alcohol and drugs to incapacitate their victims and to facilitate sexual assaults. **Alcohol is still the most frequently used substance to facilitate a sexual assault.** See Michigan Sexual Assault Systems Task Force, *The Response to Sexual Assault: Removing Barriers to Services and Justice* (April 2001), p 46. However, other substances like GHB and Rohypnol are also frequently used for their more extreme pharmacological effects, such as amnesia, reduction of sexual inhibitions, impairment of judgment, and loss of consciousness, to name but a few.

A. Common Characteristics of Drug-Facilitated Sexual Assault

In a memorandum distributed to rape crisis professionals, healthcare providers, law enforcement personnel and other interested persons, an attorney for the U.S. Department of Justice identified some common characteristics of drug-facilitated sexual assault cases:

- Reporting delays are a natural consequence of drug-facilitated sexual assault.
- Some drug facilitators may completely incapacitate the victim physically, but not necessarily mentally.
- Some drug facilitators may cause the victim to engage in conduct not normally committed by the victim. See Lipman, *Drug-Facilitated Rape* (U.S. Department of Justice, January 1999), p 2.

B. Michigan's Drug-Facilitated CSC Crime

*For more information on this crime, see Section 3.12.

Under MCL 333.7401a,* a person who, without the individual's consent, delivers or causes to be delivered a controlled substance or GBL (gamma-butyrolactone, the analogue of GHB) to commit or attempt to commit any criminal sexual conduct crime against the victim is guilty of a felony punishable by not more than 20 years. However, even though MCL 333.7401a requires an unconsented delivery of a drug facilitator, it is important to note that a victim who consents to the delivery of a drug facilitator—i.e., voluntarily ingests the drug facilitator—is not necessarily consenting to a subsequent sexual act. In *The Response to Sexual Assault: Removing Barriers to Services and Justice* (April 2001), p 46, the Michigan Sexual Assault Systems Response Task Force stated that "[a]lthough [victims] also consume alcohol and drugs voluntarily, in these circumstances alcohol and drugs can be used as a weapon by perpetrators who use [the victim's] intoxication and diminished ability to assault [him or] her."

C. Forensic Evidence Collection Issues

The following observations were made regarding the difficulty of performing law enforcement investigations in drug-facilitated sexual assault cases:

> "Investigations of suspected drug-facilitated [sexual] assaults often turn out to be inconclusive because many victims do not seek assistance until hours or days later, in part because the drugs have impaired recall and in part because victims may not recognize the signs of sexual assault. By the time they do report a suspected assault, conclusive forensic evidence may have been lost. Even when victims do suspect a drug-facilitated rape and seek help immediately, law enforcement agencies may not know how to collect evidence appropriately or how to test urine using the sensitive method required." Fitzgerald & Riley, *Drug-Facilitated Rape: Looking for the Missing Pieces*, Journal (Nat'l Inst of Justice, April 2000), p 10-11.

In cases of suspected drug-facilitated sexual assault, it is recommended that urine samples be collected from the alleged victim as soon as possible to detect the presence of drugs that might not be detectable with blood samples. One forensic examiner/toxicologist, noting that many sexual assault evidence kits* do not provide containers for urine, explained the need for such urine containers and samples, comparing the forensic need for urine versus blood samples:

*For information on Michigan's sexual assault evidence collection methods, see Section 8.7(B) and Appendix D.

> "Given the fact that there is usually a substantial delay between the drugging and the reporting of the crime, the urine allows for a longer window of detection of drugs commonly used in these crimes. The sooner the urine specimen is obtained after the alleged event, the greater the chance of detecting drugs that are quickly eliminated from the body. A urine specimen is probably of little value if it is obtained after four days of the suspected drugging of the victim. For an extensive analysis to be performed, it is recommended that a minimum of 30 mL [milliliters] of urine be collected; however, 100 mL is preferred.
>
> "Because drugs are generally detectable in blood specimens a much shorter period than in urine, blood specimens are usually useful only when the collection has occurred within 24 hours of the drugging. The blood (approximately 30 mL) should be collected in a container with preservatives (such as gray-top tubes containing sodium fluoride and potassium oxalate) and refrigerated. This blood specimen should be collected in addition to blood specimens needed for other forensic testing (i.e., serology or DNA)." LeBeau, *Toxicological Investigations of Drug-Facilitated Sexual Assaults*, 1 Forensic Science Communications (April 1999).

Additionally, because drug facilitators are often stored in innocuous-looking containers, such as water bottles, eye droppers, window cleaning bottles, etc., law enforcement personnel should specifically request to search such containers in affidavits that accompany search warrants.

For further information on toxicological investigations, see *The Prosecution of Rhypnol and GHB Related Sexual Assaults* (American Prosecutors Research Institute, 1999), Chapter 2.

D. Types and Characteristics of Common Drug Facilitators

This subsection discusses various drug facilitators commonly used to facilitate sexual assaults. Each listed drug facilitator is identified by common title and chemical name, and includes, when appropriate, the applicable Michigan controlled substance schedules. Also listed are each drug facilitator's common pharmacological effects.

F Ecstasy

- Common names: Ecstasy, XTC, X, MDMA, Adam.
- Chemical name: 3, 4-methlyenedioxy amphetamine.
- Michigan's controlled substance schedule: Schedule 1, MCL 333.7212(1)(c).

- Pharmacological effects: hallucinations, memory loss, cognitive impairment, psychosis, long-term neurochemical and brain cell damage, and hypothermia.

F GHB (Gamma Hydroxybutyrate)

- Common names: GHB, G, Liquid X, Liquid Ecstasy, Grievous Bodily Harm, Georgia Home Boy, Scoop, Great Hormones at Bedtime, Salty Water, Water, Everclear, Aminos, GH Buddy, Blue Monster.
- Chemical name: gamma hydroxybutyrate.
- Michigan's controlled substance schedule: Schedule 1, MCL 333.7212(1)(f).
- Pharmacological effects: dizziness, nausea, memory loss (amnesia), hallucinations, hypotension, severe respiratory depression, unconsciousness, and coma.

F GBL (Gamma Butyrolactone)

- Common names: BLO, Blow.
- Chemical name: gamma-butyrolactone, 2(3h)-furanone di-hydro.
- Michigan's controlled substance schedule: GBL is not listed as a controlled substance. However, see MCL 333.7104(3) governing controlled substance analogues, and MCL 333.7401b governing the manufacture, delivery, and possession of GBL, discussed in Section 3.12.
- Pharmacological effects: dizziness, nausea, memory loss (amnesia), hallucinations, hypotension, severe respiratory depression, unconsciousness, and coma.

F Rohypnol

- Common names: Roofies, R-2, Mexican valium, forget-me pill.
- Chemical name: flunitrazepam.
- Michigan's controlled substance schedule: Schedule 4, MCL 333.7218(1)(a).
- Pharmacological effects: sedation, muscle relaxation, partial amnesia, anxiety reduction.

F Amphetamines/Methamphetamines

- Common names: Speed, ice.
- Chemical name: amphetamine, dextroamphetamine, methamphetamine.
- Michigan's controlled substance schedule: Schedule 2, MCL 333.7214(c)(i)-(ii).
- Pharmacological effects: psychosis, schizophrenia, paranoia, auditory and visual hallucinations, violent and erratic behavior.

F LSD (Lysergic Acid Diethlyamide)

- Common names: LSD.
- Chemical name: lysergic acid diethylamide.
- Michigan's controlled substance schedule: Schedule 1, MCL 333.7212(1)(c).
- Pharmacological effects: hallucination, impaired and distorted depth and time perception, impaired judgment, acute anxiety, acute depression, flashbacks.

Much of the foregoing information on drug facilitators was obtained through the U.S. Drug Enforcement Administration's website at http://www.usdoj.gov/dea/concern/concern.htm (last visited July 25, 2002). For specific information on GHB and its analogue GBL, see http://www.ashesonthesea.com (last visited July 25, 2002) and Poratta, *GHB—Forever Changing the Fabric of Sexual Assault Investigations*, 3 Sexual Assault Report 3 (January/February 2000), p 33, 47-48.